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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/080,507	02/22/2002	Jae Chang Jung	00939B-068710US	1185

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EXAMINER

LEE, SIN J

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 08/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/080,507	Applicant(s) JUNG ET AL.	
	Examiner Sin J. Lee	Art Unit 1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/465,111.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

TS

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DETAILED ACTION

1. In view of the amendment of June 2, 2005, previous 103(a) rejection on claims 1, 3 and 5-19 over Kajita et al'316 is hereby withdrawn since Kajita does not teach or suggest present crosslinking monomer of claims 1 and 5, in which R represents a straight C₁₋₁₀ alkyl group.
2. In view of the statement of common ownership, previous 103(a) rejection on claims 20 and 21 over Lee et al'281 is hereby withdrawn.
3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

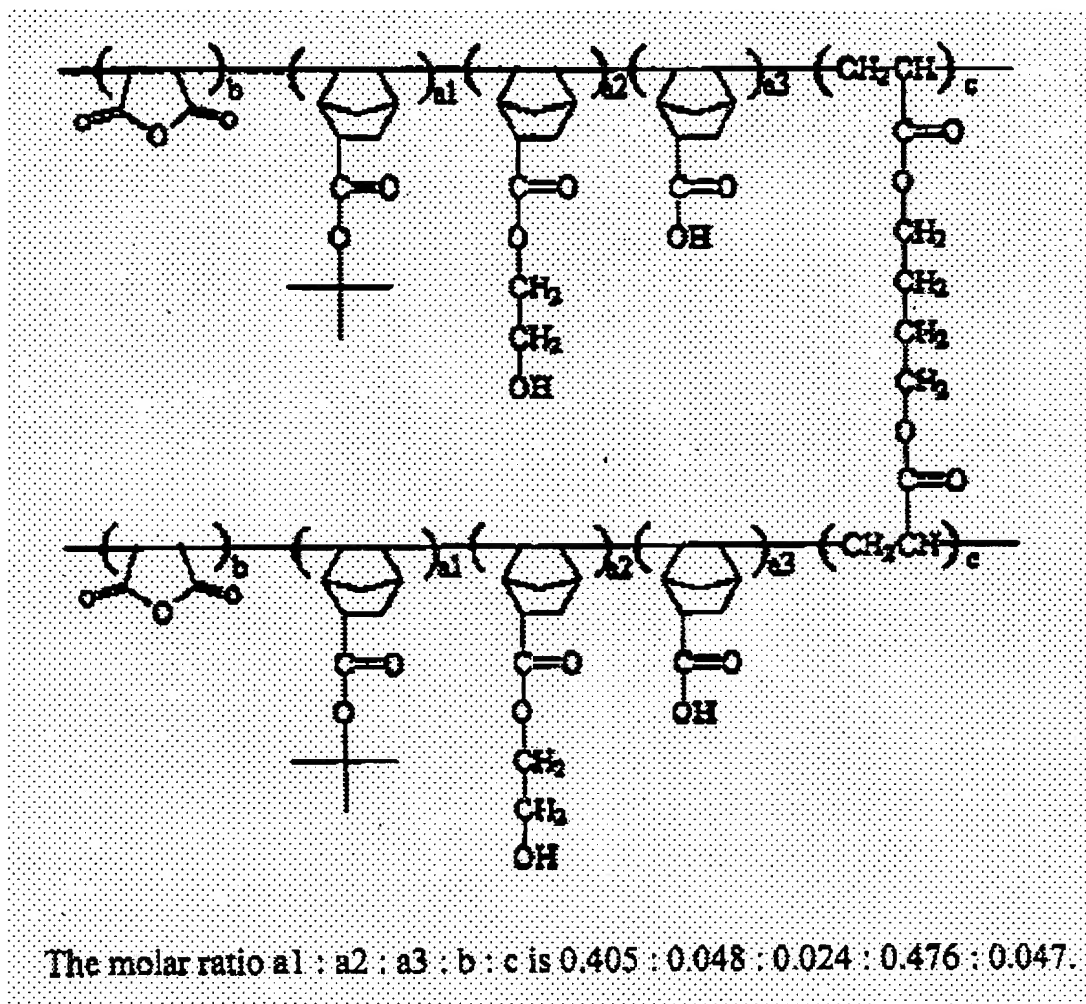
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Claim Rejections - 35 USC § 102

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
5. Claims 1 and 3-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Jung et al (GB 2 345 286 A).

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In Example 2 (see pg.11 and 12) Jung teaches the synthesis of poly(maleic anhydride/2-hydroxyethyl 5-norbornene-2-carboxylate/tert-butyl 5-norbornene-2-carboxylate/5-norbornene-2-carboxylic acid/1,4-butanediol diacrylate), which structure is shown below:



This polymer is exactly the same as that of present Example 2, and it teaches present inventions of claims 1, 3-10, 20, and 21 (it is the Examiner's position that the presence of the monomer units "a1" and "a3" shown above does not materially affect the basic and

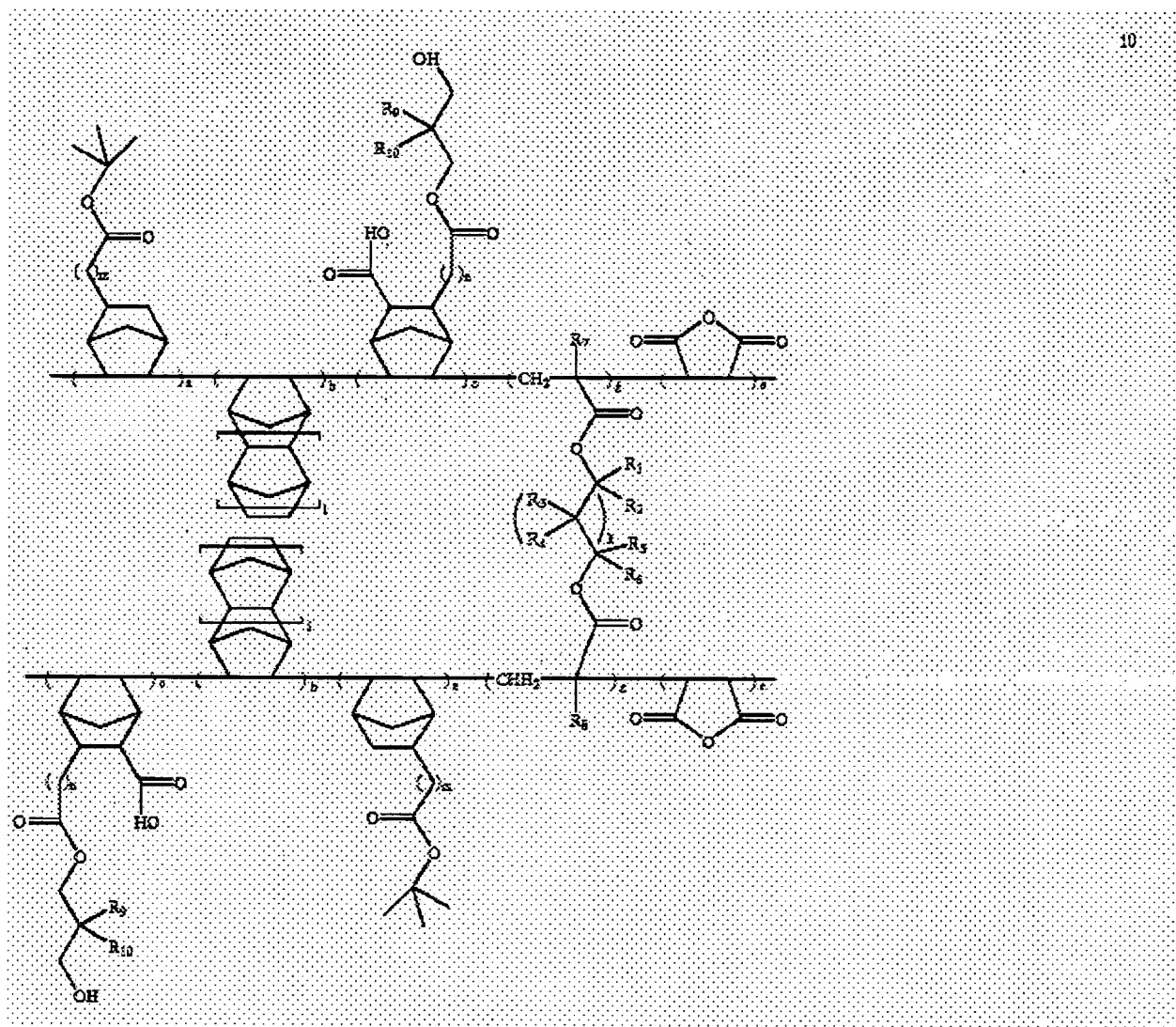
novel characteristic(s) of the claimed invention because those monomer units are also included in the polymer made in present Example 2).

In Example 4, Jung dissolves his polymer in an organic solvent together with triphenylsulfonium triflate (a photoacid generator). The photoresist composition thus prepared is spin-coated on a silicon wafer and soft-baked at 110°C. Then, after irradiating using ArF laser exposer, the wafer is post-baked at 110°C, and it is developed in TMAH solution to obtain a L/S pattern. Thus, the prior art teaches present inventions of claims 11-19.

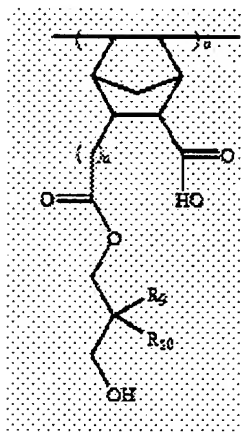
6. Claims 1, 3 and 11-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al (6,403,281 B1).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Lee teaches (col.6, lines 18-67, col.7, lines 48-53) the following polymer of the formula 10 as one of the two preferred photoresist polymers of his invention:



As shown above, Lee's polymer contains *two* of the following repeating unit;



in which n is an integer from 0-2, and R_9 and R_{10} are H, or linear or branched C_1 - C_5 alkyl. Based on this teaching, one of ordinary skill in the art would immediately envisage the repeating unit shown above in which n is 0, and both of R_9 and R_{10} are H (because there are only several choices given for the variables n , R_9 and R_{10}). The monomer which forms such repeating unit teaches present monomer of Chemical Formula 4 of claim 1: present k would be 1; p would be 0; R_5 would be H; R_2 and R_3 would be H atoms; R_4 would be a straight C_1 carboxylic acid; and R_1 would be a straight C_4 ester including one hydroxyl group. Therefore, Lee teaches present component (a) two alicyclic olefin derivatives of the Chemical Formula 4 in present claim 1.

Lee teaches that R_1 - R_6 in the repeating unit "d" in his polymer (as shown above) can independently be H, or linear or branched C_1 - C_5 alkyl group. Therefore, one of ordinary skill in the art would immediately envisage all of R_1 - R_6 to be H atoms (because there are only several choices given for the variables R_1 - R_6). The monomer which forms such repeating unit teaches present crosslinking monomer of the formula shown in present claim 1: present m would be an integer of 1, and present R would be a straight C_3 alkyl group. Therefore, Lee teaches present component (b) of claim 1.

Lee's polymer shown above also includes the maleic anhydride repeating unit.

Therefore, Lee teaches present invention of claim 1 (*although Lee's polymer shown above does include the monomer unit of norbornene or tetracyclododecene, it is the Examiner's position that presence of such monomer units would not materially affect the basic and novel characteristic(s) of the claimed invention in the absence of proof, which shows otherwise, submitted by applicants. Also, the monomer unit of t-butyl 5-norbornene-2-carboxylate would not materially affect the basic and novel characteristic(s) of the claimed invention as such monomer unit is also included in the present polymer of Example 2).*

With respect to present claim 3, Lee teaches that in his photoresist copolymer shown above, the repeating unit "c" can be present in 1-30 mol%, the repeating unit "e" can be present in 10-50 mol %, the repeating unit "d" can be present in 0.1-48 mol%. Based on this teaching, one of ordinary skill in the art would immediately envisage the repeating unit "c" to be present in 1 mol% (because 1 mol % is included as the lower end of the taught range), the repeating unit "e" to be present 10 mol% (because 10 mol% is included as the lower end of the taught range), and the repeating unit "d" to be present in 0.1 mol% (because 0.1 mol% is included as the lower end of the taught range). Since these numbers fall within the present ranges of claim 3, Lee teaches present invention of claim 3.

With respect to present claims 11-13, Lee teaches (col.9, lines 51-65) a photoresist composition comprising his photoresist polymer, an organic solvent, and a photoacid generator, and the examples for the photoacid generator given by Lee in

col.9, lines 54-65 are the same as those listed in present claim 13. Therefore, Lee teaches present inventions of claims 11-13.

With respect to present claims 14-18, Lee teaches (col.10, lines 28-48) a process for forming a photoresist pattern comprising the steps of (a) coating a photoresist composition on a substrate of a semiconductor element to form a photoresist film, (b) exposing the photoresist film to light using a light source such as ArF, KrF, EUV, VUV, E-beam, X-ray and ion beam, and (c) developing the exposed photoresist film using an aqueous solution of TMAH. Lee furthermore teaches that preferably, a baking step before and/or after the exposure step is performed at temperature in the range of 70-200°C. Therefore, Lee teaches present inventions of claims 14-18.

Lee also teaches (col.10, lines 48-51) a semiconductor device which is manufactured using his photoresist composition. Therefore, Lee also teaches present invention of claim 19.

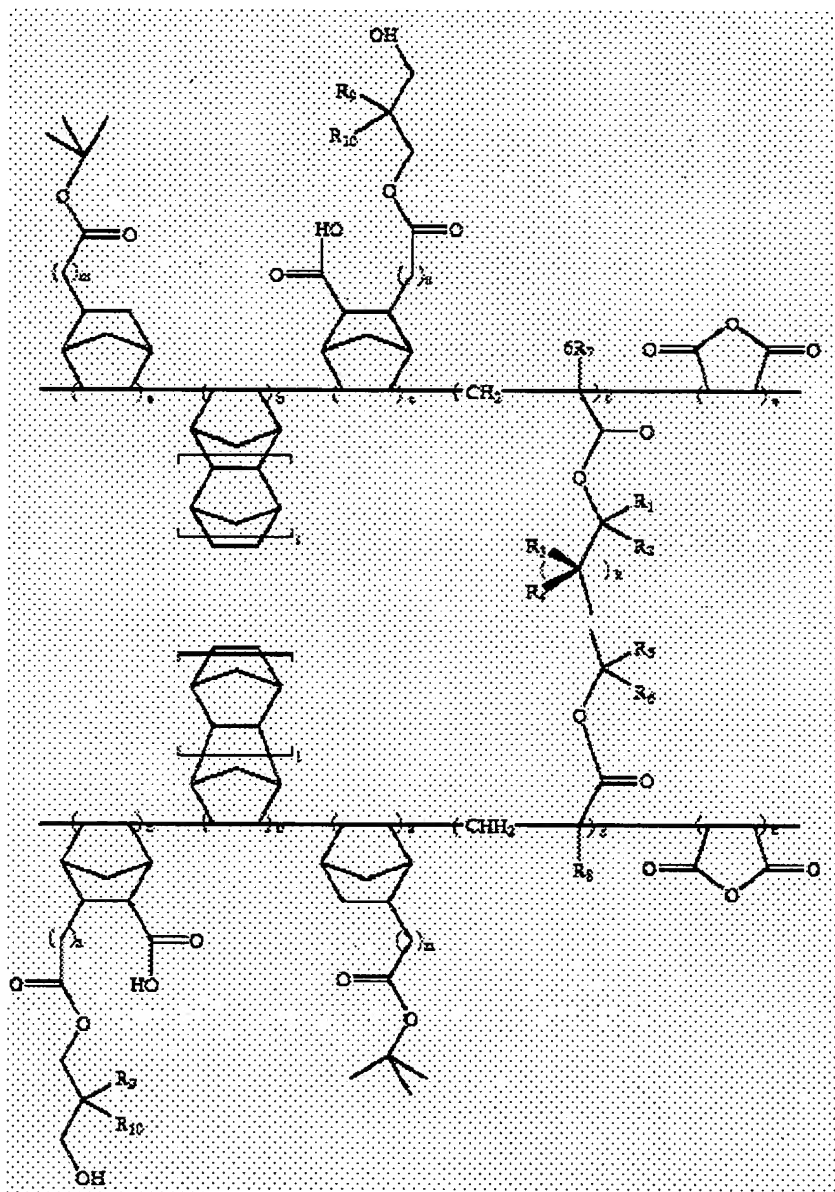
Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

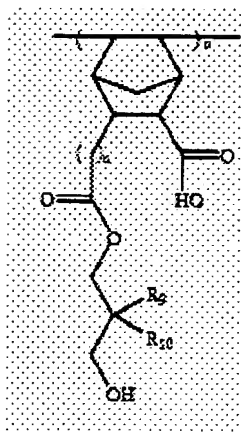
A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1, 3, 11-17, and 19-21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4-8, 10, 12, 16-19, and 21 of U.S. Patent No. 6,403,281 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons: Claim 4 of Pat.'281 teaches the following photoresist copolymer;



The polymer shown above contains *two* of the following repeating unit;



in which n is an integer from 0-2, and R_9 and R_{10} are H, or linear or branched C_1 - C_5 alkyl. Based on this teaching, it would have been obvious to one of ordinary skill in the art to obtain the repeating unit shown above in which n is 0, and both of R_9 and R_{10} are H (because there are only several choices given for the variables n , R_9 and R_{10}) with a reasonable expectation of obtaining the photoresist copolymer of claim 4 of Pat.'281.

The monomer which forms such repeating unit teaches present monomer of Chemical Formula 4 of claim 1: present k would be 1; p would be 0; R_5 would be H; R_2 and R_3 would be H atoms; R_4 would be a straight C_1 carboxylic acid; and R_1 would be a straight C_4 ester including one hydroxyl group. Therefore, claim 4 of Pat.'281 renders obvious the present component (a) two alicyclic olefin derivatives of the Chemical Formula 4 in present claim 1. Claim 4 of Pat.'281 also teaches that R_1 - R_6 in the repeating unit "d" in the polymer (as shown above) can independently be H, or linear or branched C_1 - C_5 alkyl group. Therefore, it would have been obvious to one of ordinary skill in the art to choose all of R_1 - R_6 to be H atoms (because there are only several choices given for the variables R_1 - R_6) with a reasonable expectation of obtaining the photoresist copolymer of claim 4 of Pat.'281. The monomer which forms such repeating unit teaches present

crosslinking monomer of the formula shown in present claim 1: present m would be an integer of 1, and present R would be a straight C₃ alkyl group. Therefore, claim 4 of Pat.'281 renders obvious present component (b) of claim 1. The polymer shown above also includes the maleic anhydride repeating unit. Therefore, Pat.'281 teaches present invention of claim 1 (*although the polymer shown above does include the monomer unit of norbornene or tetracyclododecene, it is the Examiner's position that presence of such monomer units would not materially affect the basic and novel characteristic(s) of the claimed invention in the absence of proof, which show otherwise, submitted by applicants. Also, the monomer unit of t-butyl 5-norbornene-2-carboxylate would not materially affect the basic and novel characteristic(s) of the claimed invention as such monomer unit is also included in the present polymer of Example 2).*

With respect to present claim 3, claim 4 of Pat.'281 teaches that in the photoresist copolymer shown above, the repeating unit "c" can be present in 1-30 mol%, the repeating unit "e" can be present in 10-50 mol %, the repeating unit "d" can be present in 0.1-48 mol%. Since these numbers overlap with the present ranges of claim 3, claim 4 of Pat.'281 would render obvious present invention of claim 3. In the case "where the [claimed] ranges overlap or lie inside ranges disclosed by the prior art," a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

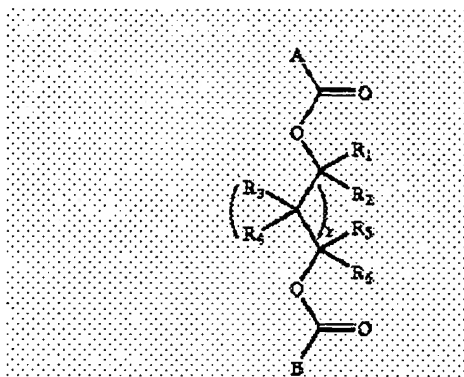
With respect to present claims 11-13, claims 10 and 12 of Pat.'281 teach a photoresist composition comprising the photoresist polymer, an organic solvent, and a photoacid generator, and the examples for the photoacid generator given in claim 12 of

Pat.'281 are the same as those listed in present claim 13. Therefore, Pat.'281 renders obvious present inventions of claims 11-13.

With respect to present claims 14-17, claims 16 and 19 of Pat.'281 teach a process for forming a photoresist pattern comprising the steps of (a) coating a photoresist composition on a substrate of a semiconductor element to form a photoresist film, (b) exposing the photoresist film to light using a light source such as ArF, KrF, EUV, VUV, E-beam, X-ray and ion beam, and (c) developing the exposed photoresist film. Claims 17 and 18 of Pat.'281 furthermore teaches that a baking step before and/or after the exposure step is performed at temperature in the range of 70-200°C. Therefore, Pat.'281 renders obvious present inventions of claims 14-17.

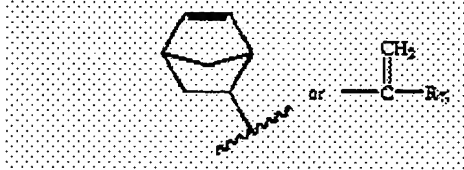
Claim 21 of Pat.'281 teaches a semiconductor device which is manufactured using his photoresist composition. Therefore, Pat.'281 also renders obvious present invention of claim 19.

With respect to present claims 20 and 21, as described above, Pat.'281 teaches present alicyclic olefin derivatives of claims 20 and 21 and present maleic anhydride units of claims 20 and 21. As to the present cross-linking monomer comprising 1,3-butanediol diacrylate or 1,4-butanediol diacrylate, claim 1 of Pat.'281 teaches a crosslinker monomer of the following formula



where

A is a moiety of the formula



B is a moiety of the formula



Claim 1 of Pat.'281 furthermore teaches that R_7 and R_8 can be H or linear or branched C_1 - C_5 alkyl group; R_1 - R_6 independently represent H, or linear or branched C_1 - C_5 alkyl group, and that k is an integer from 0 to 3. Based on this teaching, it would have been obvious to choose the crosslinker monomer of the formula shown above in which A and B both are moiety of the formula $-C(=CH_2)-H$, k is 2, and R_1 - R_6 are all H atoms (*in which case, the monomer would be the presently claimed 1,4-butanediol diacrylate*) with a reasonable expectation of obtaining the photoresist polymer of claim 1 of Pat.'281. Therefore, the teaching of Pat.'281 would render obvious present inventions of claims 20 and 21.

Response to Arguments

9. Applicants argue that present application has an effective filing date of December 16, 1999 with respect to all subject matter disclosed in Jung et al (GB'286), which date is prior to the publication of Jung et al on July 5, 2000. Thus, applicants argue that the rejection under 35 USC 102(b) over Jung et al should be overcome. The Examiner disagrees. The limitation of present claims 1, 5, 20, and 21 "wherein, all of R₁, R₂, R₃, and R₄ do not represent hydrogen at the same time and at least one of R₁, R₂, R₃, and R₄ represent . . . at least one hydroxyl group" is not supported in the parent application 09/465,111. Therefore, present application cannot have the effective filing date of December 16, 1999.

Applicants also argue that Jung et al does not teach the limitation cited above, and thus the claims of present invention avoid the rejection under 35 USC 102(b). The Examiner disagrees. The repeating unit (a2) in Jung's polymer of Example 2 (again, this polymer is exactly the same as that of present Example 2) teaches present <Chemical Formula 4> in which R₁, R₃, and R₄ are H atoms and R₂ represents -C(=O)-O-CH₂CH₂-OH (which is present straight C₂ ester including one hydroxyl group). Thus, Jung teaches present limitation cited above.

With respect to present 102(e) rejection over Lee et al'281, applicants argue that the language of independent claim 1 excludes the use of *any other monomers* than (a)-(c) to derive the polymer and that Lee's norbornene or tetracyclododecene monomer is *expressly* excluded from the monomers used to derive the claimed polymer. Applicants furthermore argue that the exclusive use of an alicyclic olefin derivative monomer of the

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present formula in which R_1 - R_4 do not represent H at the same time in the derivation of the polymer is not disclosed by Lee and thus claim 1 is not anticipated by Lee. The Examiner disagrees. The language of independent claim 1 *does not exclude* the use of *any other* monomers than (a)-(c) (nor does it *expressly exclude* Lee's norbornene or tetracyclododecene monomer). For example, present polymer of Example 2 does include the monomer unit of tert-butyl 5-norbornene-2-carboxylate and the monomer unit of 5-norbornene-2-carboxylic acid, and neither of those two monomer units meets <Chemical Formula 4>. The transitional phrase used in claim 1 is not "consisting of" but "consisting essentially of", which permits the presence of other monomers than (a)-(c) as long as the monomers do not materially affect the basic and novel characteristics of the claimed invention (and applicants have not proven that the presence of norbornene or tetracyclododecene materially affects the basic and novel characteristics of the presently claimed invention).

Applicants argue that each of the alicyclic monomers that are present in the present polymer have the present <Chemical Formula 4>. The Examiner disagrees. For example, present polymer of Example 2 includes tert-butyl 5-norbornene-2-carboxylate monomer unit and 5-norbornene-2-carboxylic acid monomer unit. Even though both of those units are alicyclic monomers, they do not have the present <Chemical Formula 4>. *Present claim language does not say that all of the alicyclic monomer that is present in the present polymer has to have <Chemical Formula 4>.*

Applicants argue that because Lee states that his polymer having norbornene and tetracyclododecene makes it possible to properly control the Mw of the polymer to

5000-8000 and to increase the polymerization yield to about 40% or more, it follows that the present claimed polymer, which does not have the norbornene and tetracyclododecene monomer units, would have materially different characteristics than the polymer disclosed by Lee. However, applicants' such argument is not persuasive because applicants have not proven that the presence of norbornene or tetracyclododecene does materially affect the basic and novel characteristics of the *presently claimed invention*.

For the reasons stated above, present rejections over Jung et al (GB'285) and over Lee et al'281 still stand.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. J. L.

S. Lee
August 17, 2005

Sin J. Lee
SIN LEE
PRIMARY EXAMINER